



DEPARTMENT OF THE NAVY
NAVAL AIR SYSTEMS COMMAND
NAVAL AIR SYSTEMS COMMAND HEADQUARTERS
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IN REPLY REFER TO

NAVAIRINST 2450.2
AIR-4.1.7
4 Jun 99

NAVAIR INSTRUCTION 2450.2

From: Commander, Naval Air Systems Command

Subj: ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E³) CONTROL WITHIN THE
NAVAL AIR SYSTEMS COMMAND

Ref: (a) SECNAVINST 5000.2B
(b) OPNAVINST 2450.2
(c) CNO ltr Ser 09/9U500833, EMI Control Within the Navy, of 17 Mar 89 (NOTAL)
(d) OPNAVINST 2400.20E
(e) OPNAVINST 8023.2
(f) NSTISSP 300, National Policy on Control of Compromising Emanations,
of 29 Nov 93
(g) OPNAVINST C5510.93E, Navy Implementation of National Policy on Control
of Compromising Emanations (U)
(h) MIL-STD-464, Department of Defense Interface Standard, Electromagnetic
Environmental Effects, Requirements for Systems, of 18 Mar 97
(i) MIL-HDBK 237, Electromagnetic Compatibility Management Guide for Platforms,
Systems, Equipment, of 1 Oct 97
(j) NAVSEA OP3565/NAVAIR 16-1-529/NAVELEX 9067-LP-624-6010, Technical
Manual Electromagnetic Radiation Hazards," of 15 Apr 88
(k) NAVSEAINST 8020.7

1. Purpose. To establish the Naval Aviation Systems Team (TEAM) policy, procedures, responsibilities, and requirements for Electromagnetic Environmental Effects (E³) control and spectrum management following regulatory requirements, national policy, and safety considerations. This instruction applies to the TEAM, and all activities that support the TEAM, in planning, designing, developing, acquiring, leasing, producing, procuring, installing, modifying, testing, operating, and maintaining air vehicle systems and subsystems, Air Traffic Control (ATC) and landing systems, weapons, Communications-Electronic (C-E) equipment, commercial items, Non-Developmental Items (NDIs), and ordnance.

2. Cancellation. This instruction supersedes NAVAIR Instructions 2410.ID and 8020.4B. Since this is a major revision, changes have not been indicated.

3. Background

a. Reference (a) requires that E³ and spectrum management be considered part of a comprehensive, structured, integrated, and disciplined approach to the life-cycle design of

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weapons and information technology systems applicable to all Department of the Navy (DoN) acquisitions. Reference (a) designates the Chief of Naval Operations (CNO) (N6) as the DoN executive for spectrum management and Electromagnetic Compatibility (EMC).

b. Reference (b) assigns responsibilities for EMC within the DoN, and cites reference (c), The Strategic Plan for Electromagnetic Environment Management, to provide Navy policy, guidance, and programmatic actions to enhance EMC at all levels. The Strategic Plan also directs the Commander, Naval Air Systems Command (COMNAVAIRSYSCOM) to provide leadership and direction for an EMC certification process by establishing criteria for EMC accreditation of laboratories and certification of personnel.

c. Reference (d) assigns to the CNO (N61) the regulatory responsibility to secure frequency allocations. It assigns to the Naval Electromagnetic Spectrum Center (NAVEMSCEN) the responsibility to authorize frequency assignments for systems, subsystems, or equipment developed or procured for the DoN that intentionally transmit or receive Electromagnetic Radiation (EMR). Reference (d) also contains the application DD Form 1494 (8/96), Application for Equipment Frequency Allocation. The Omnibus Reconciliation Act of 1993 initiated the reallocation and sale of spectrum formerly owned by the Department of Defense (DoD). Therefore it is of the utmost importance to submit DD Form 1494 as early as possible during the acquisition process to protect from spectrum encroachment.

a. Reference (e) provides the DoN Hazards of Electromagnetic Radiation to Ordnance (HERO) policy.

b. References (f) and (g) provide the DoD and DoN TEMPEST policy. C-E equipment, computers, and other electrical or electronic information processing equipment, individually or as a system, can generate electromagnetic emanations. These emanations are of TEMPEST interest if they can be correlated to any classified information.

c. References (h) through (k) are documents which provide additional guidance from which to construct and implement an E³ program.

4. Policy

a. E³ control and spectrum management will be addressed for all TEAM acquisitions of air vehicle systems and subsystems, ATC and landing systems, weapons, C-E equipment, commercial and NDIs, and ordnance.

b. A comprehensive program will be conducted to ensure that E³ control is implemented for all the electromagnetic disciplines and that the frequency of operation is supportable. The program will comply with this policy which encompasses conformance with regulatory requirements, national policy, and safety considerations for operation of air vehicles and their associated systems, subsystems, and equipment.

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c. E³ assessments will be conducted to ensure that E³ control is achieved for the intended operational and battlespace Electromagnetic Environment (EME) and that the frequency of operation is supportable.

d. Spectrum management guidance for all C-E systems will be obtained in the early stages of acquisition and funds will not be obligated beyond conceptual stage 1 until a frequency allocation has been approved by the CNO (N61) following reference (d).

e. Facility accreditation is required for all public and private laboratories conducting Electromagnetic Interference (EMI) control qualification testing using MIL-STD-462 methods and procedures.

f. A formal EMC certification is required for all lead E³ personnel supporting TEAM platforms, systems, subsystems, and equipment development, modification, and modernization procurements.

g. Prior to approval for Low Rate Initial Production (LRIP) or Production Approval (PA) for service use, all ordnance and systems or equipment with Electrically Initiated Devices (EIDs) shall be evaluated by the Commander, Naval Ordnance Center (COMNAVORDCEN) Weapons and Explosives Safety Office (N71) and certified for HERO. When overriding fleet requirements exist, System Command (SYSCOM) Commanders or the Program Executive Officers (PEOs) responsible for development and deployment of ordnance and materiel have the authority to grant a waiver with concurrence of the Weapon System Explosives Safety Review Board (WSESRB) and the NAVORDCEN (N71).

5. Definitions

a. Air Systems Electromagnetic Interference Corrective Action Program (ASEMICAP). A fleet support program which provides E³ engineering expertise with the following objectives and priorities: investigate and provide corrective action for EMI problems affecting fleet aviation safety and readiness; provide solutions to naval aviation EMI problems in support of joint, allied, and interagency operations; update and maintain an EMI control reporting and information exchange system for feedback to the TEAM; maintain EMI awareness within the fleet and its supporting units; and assess E³ hardness of fleet assets.

b. Battlespace Electromagnetic Environment. The Electromagnetic Environment created by friendly forces and enemy forces in a defined battlespace.

c. Communications-Electronics (C-E). The specialized field concerned with the use of electronic devices and systems for the acquisition or acceptance, processing, storage, display, analysis, protection, disposition, and transfer of information.

d. Electrically Initiated Device (EID). Any component activated through electrical means and having an explosive, pyrotechnic, or mechanical output resulting from an explosive, or pyrotechnic action, and electrothermal devices having a dynamic mechanical, thermal, or

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electromagnetic output. Examples include bridgewire electroexplosive devices, conductive composition electric primers, semiconductor bridge electroexplosive devices, laser initiators, exploding foil initiators, slapper detonators, burn wires, and fusible links.

e. Electromagnetic Compatibility (EMC). The capability of systems, subsystems, and equipment to operate in their intended electromagnetic environment, within a defined margin of safety, and at design levels of performance without suffering or causing unacceptable degradation as a result of electromagnetic interference. Previously the term EMC had been used interchangeably with electromagnetic environmental effects to define some or all of the electromagnetic environmental effects disciplines listed below.

f. Electromagnetic Environment (EME). The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels that may be encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. It is the sum of electromagnetic environmental effects.

g. Electromagnetic Environmental Effects (E³). The impact of the electromagnetic environment upon the operational capability of military forces, systems, subsystems, equipment, and platforms. It encompasses all electromagnetic disciplines including: electromagnetic compatibility; electromagnetic interference; electromagnetic vulnerability; electromagnetic pulse; electronic protection; hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; TEMPEST; and natural phenomena effects of lightning; electrostatic discharge; and precipitation static (p-static).

h. E³ Working-Level Integrated Product Team (WIPT). Formerly referred to as an Electromagnetic Compatibility Advisory Board (EMCAB) the E³WIPT is intended to assist the program manager with the preparation of the E³ program plan; review all aspects of the E³ program documentation; assist the program manager in the identification and resolution of potential E³ problems during the acquisition process; and review predicted and reported E³ problems to determine operational and mission impact.

i. Electromagnetic Interference (EMI). Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics or electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like.

j. Frequency Allocation. A frequency band established by national or international rules and regulations for specific categories of radio services, such as radiolocation, radionavigation, mobile or fixed communications, and space telemetry. The term "frequency allocation" may be used synonymously with "spectrum certification."

k. Frequency Assignment. The discrete frequency or frequencies on which a C-E system, subsystem, or equipment is authorized to operate within its allocated frequency band at the location(s) designated, and within the constraints of the authorizing assignments.

l. Spectrum Management. The process of maximizing the efficient use of the electromagnetic spectrum through operational, engineering, and administrative procedures to allow electronic systems to perform their functions in their intended environment without causing or receiving unacceptable levels of interference.

m. TEMPEST. An unclassified short name (not an acronym) referring to the investigation and study of compromising emanations.

n. Waiver. A formal written authorization for deviation from contractual E³ performance or interface requirements for a platform, system, subsystem, or equipment.

6. Requirements

a. TEAM efforts will be directed towards implementing a program to achieve total system EMC in all air vehicle systems and subsystems, ATC and landing systems, weapons, C-E equipment, commercial and NDIs, and ordnance.

b. E³ assessments will be conducted during all phases of the acquisition cycle to ensure that total system compatibility is achieved and that the system can operate without being adversely affected in the intended operational and battlespace EME for each platform.

c. Applications for frequency allocation (DD Form 1494) will be initiated as soon as Radio Frequency (RF) bands of operation are identified, updated for each stage of the system life cycle, and updated again whenever significant changes are planned in system electromagnetic radiating characteristics or operational use.

d. All requests for waivers or deviations from contractual E³ performance or interface requirements must be submitted to the Integrated Product Team (IPT) E³ engineer for review and advice prior to final disposition.

e. New procurements for direct E³ engineering and technical support will require EMC engineers and EMC technicians performing in supervisory or lead roles to be certified for TEAM E³ support by the National Association of Radio and Telecommunications Engineers (NARTE).

f. To assure uniformity and quality of service, as well as repeatability and reliability of test data, TEAM members must use public and private laboratories for conducting MIL-STD-461 EMI control qualification testing, using MIL-STD-462 methods, that are accredited under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP, administered by the National Institute of Standards and Technology (NIST), provides the measure of assurance desired for TEAM programs through its laboratory accreditation program. Accreditation of facilities administered by agencies that have a Mutual Recognition Agreement (MRA) with NIST may also be used. Accreditation of EMC test laboratories, both government and industry, ensures that qualification testing will be accomplished to a consistent standard. Existing contractual arrangements need not be altered to meet this requirement unless the program manager deems it in the best interest of the program. However, requirements for the use of NVLAP-accredited facilities must be specified in the Statement of Work (SOW) and Contract Data Requirements List (CDRL) (DD Form 1423 8/96) in contractual arrangements for future procurements.

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g. Government and industry, organizations and activities providing direct engineering and technical support to TEAM programs and projects will have an engineer who is EMC certified by NARTE performing in the lead E³ role.

7. Responsibilities

a. PEOs for their respective programs will:

(1) ensure that all TEAM platforms, systems, subsystems, and equipment are designed and procured so that total system compatibility is achieved throughout the life cycle and that each can operate without being adversely affected in the intended operational and battlespace EME;

(2) ensure that all planning, acquisition, maintenance, and modernization documentation and instructions implement E³ control requirements; and

(3) ensure that Test and Evaluation Master Plans (TEMPs) address E³ control.

b. The Assistant Commander for Research and Engineering (AIR-4.0) will:

(1) provide overall acquisition and fleet guidance and coordination of the TEAM E³ program;

(2) ensure that E³ practices, standards, and processes are developed to ensure aircraft, weapons systems, and support equipment can effectively operate in their intended operational and battlespace EME throughout the life cycle without causing or sustaining mission performance degradation;

(3) establish and maintain the capability for detecting, measuring, analyzing, reporting, and correcting E³ problems in support of the fleet;

(4) ensure that procedures are published for the expeditious detection, reporting, assessment, and solution of operational E³ problems occurring in naval aviation platforms, systems, subsystems, and equipment;

(5) ensure the availability of E³ engineering processes, performance, and interface standards and other E³ criteria for use by the TEAM;

(6) provide technology support for E³ programs and for developing and implementing plans and programs for research, exploratory and advanced development, and technology demonstrations in support of E³ efforts;

(7) ensure establishment of the capability to predict and/or simulate the EME and to calculate potential EMI involving platforms, systems, subsystems, and equipment under TEAM support cognizance;

(8) ensure coordination with TEAM Acquisition Executive and Deputy Commander for Operations (AIR-1.0), Research and Technology Directorate (AIR-4.0T), and Assistant Commander for Logistics (AIR-3.0) in discharging their responsibilities and tasks listed in this instruction;

(9) ensure coordination with PEOs, AIR-1.0, and Assistant Commander for Contracts (AIR-2.0) regarding frequency allocation before funding is obligated for the development or procurement of C-E equipment;

(10) ensure development and implementation of a plan for E³ education of the TEAM and, where and when appropriate, fleet personnel. Provide necessary support to develop and maintain the Navy Training Plan (NTP) for EMI control for training aircrew, maintainers, and other fleet personnel;

(11) provide a TEAM principal point of contact and technical advisor to the Office of the Chief of Naval Operations (OPNAV) program sponsors for E³ control in naval aviation and coordinate with the SYSCOMs, NAVEMSCEN, and the Joint Spectrum Center (JSC) in solving E³ problems occurring in TEAM platforms, systems, subsystems, or equipment;

(12) as part of the Planning, Programming, and Budgeting System (PPBS) process, justify E³ program resource requirements and obtain budget approval and funding in the amounts necessary to support each element of the foregoing tasks in support of TEAM E³ efforts;

(13) designate the program manager for the ASEMICAP. ASEMICAP is the backbone of E³ engineering direct support to the fleet, and brings engineering expertise and awareness to bear on design, development, production, and operational E³ problems; and

(14) ensure coordination of E³ matters with joint, national, and international organizations concerning specifications, standards, policies, procedures, and operations.

c. Electromagnetic Environmental Effects Engineering Division (AIR-4.1.7) will:

(1) initiate, maintain, and coordinate E³ control procedures and processes within the TEAM;

(2) ensure that qualified E³ personnel are available to support TEAM programs to assist the program manager in the analysis and tailoring of E³ requirements and implementation of a comprehensive E³ control program;

(3) coordinate with Program Managers and the IPT Lead to ensure that government or contractor personnel performing E³ engineering support have the requisite E³ qualifications;

(4) coordinate TEAM E³ activities and provide liaison with the SYSCOMs, JSC, and other joint, national, and international organizations concerning specifications, standards, policies, procedures, and operations;

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(5) direct and coordinate the TEAM E³ support for HERO efforts with the Naval Sea Systems Command (NAVSEA), NAVORDCEN, and JSC;

(6) provide representation, as required, to the various acquisition review and oversight groups to ensure compliance with E³ control requirements;

(7) when requested, review TEAM acquisition documentation for adequacy of E³ control measures;

(8) analyze frequency allocation requests for compatibility with naval systems and provide comments and recommendations to the CNO (N61) for approval;

(9) establish standard procedures for E³ WIPT processing of requests for waivers for deviations from contractual E³ requirements to ensure uniform waiver practices throughout the life cycle for all platforms, systems, subsystems, and equipment;

(10) provide assistance to the Program Managers, PEOs, AIR-1.0, Assistant Program Managers (APMs), System Program Managers (SPMs) and Advanced Development Program Officers (ADPOs) in the implementation of E³ control requirements and in the preparation, review, and update of requests for Application for Equipment Frequency Allocation, (DD Form 1494) per reference (d);

(11) ensure E³ technological capabilities are maintained to an acceptable standard by monitoring the TEAM's compliance with the stated requirements for accreditation of government and industrial laboratories and certification of E³ engineers and technicians;

(12) ensure certified Aircraft TEMPEST Control Engineers (ATCE) are available to support TEAM programs; and

(13) ensure efficient and effective management of the ASEMICAP and maintenance of the ASEMICAP Management Information and Tracking System (AMITS).

d. AIR-1.0 for AIR-1.0 managed programs, will:

(1) ensure that all TEAM platforms, systems, subsystems, and equipment are designed and procured so that total system compatibility is achieved and each can operate without being adversely affected in the intended operational and battlespace EME;

(2) ensure that all planning, acquisition, maintenance, and modernization documentation and instructions implement E³ control requirements; and

(3) ensure that TEMPs address E³ control requirements.

e. AIR-2.0 will ensure coordination with AIR-4.1.7 for the status of frequency allocation requests prior to contract award for the development, production, or procurement of any systems, subsystems or equipment that intentionally transmit or receive electromagnetic radiation.

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f. AIR-3.0 will provide support and funding as required for installation of E³-related changes and maintenance procedures.

g. Program Managers Air (PMAs) and other acquisition managers will:

- (1) provide funding to support a comprehensive E³ program;
- (2) coordinate with AIR-4.1.7 as needed for assignment of qualified E³ engineering IPT support.
- (3) ensure all procurement requests, including engineering requests dealing with E³ technology, are coordinated with and reviewed by the IPT E³ engineer to ensure that appropriate E³ requirements are included in contractual and acquisition documentation;
- (4) ensure preparation of an E³ program plan, and the establishment of an E³ WIPT (reference (i)) when required;
- (5) submit a frequency allocation request (DD Form 1494) as required to AIR-4.1.7 for all C-E equipment per reference (d). Commercial items and NDIs are not exempt from frequency allocation requirements;
- (6) ensure compliance with TEAM requirements as specified in paragraph 6 above;
- (7) ensure that E³ control is an integral part of the configuration control process for Engineering Change Proposals (ECP's);
- (8) ensure that TEMP's address E³ control requirements;
- (9) coordinate with AIR-4.1.7 to ensure a copy of all pertinent E³ acquisition documentation is available for inclusion in AMITS. This is required to support the ASEMICAP by providing a baseline E³ configuration for future system assessments; and
- (10) ensure implementation of a HERO program following references (e) and (k). When required, submit HERO certification requests (reference (e)) to the NAVORDCEN (N71) with copy to AIR-4.1.7.

h. Commander, Naval Air Forces, Atlantic Fleet; Commander, Naval Air Forces, Pacific Fleet; and Commander, Naval Air Reserve Forces will:

- (1) maintain a viable program within the fleet to identify and report suspected and identified EMI problems; and
- (2) maintain an active E³ awareness training program to assist in reducing the deleterious effects of the EME.

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i. Commander, Naval Air Warfare Center will:

(1) develop and maintain measurement capabilities to verify the EMC of TEAM platforms, systems, subsystems, and equipment in the EME;

(2) assist AIR-4.0 in qualifying E³ hardness assurance of systems by maintaining the capability to conduct E³ qualification testing; and

(3) ensure compliance with the requirements of paragraph 6 (e) above.

j. Defense Contract Management Command (DCMC) will:

(1) monitor all contractors' required E³ test efforts to validate the completeness and accuracy of tests; and

(2) work with the contractor and the E³ WIPT in addressing E³ problems;

k. The NAVORDCEN (N71) will ensure the DoN HERO program and program administrative duties are conducted following references (e) and (k).

8. Action

a. PMAs and other acquisition managers will ensure compliance with paragraphs 6 and 7g, herein and:

(1) include contractual provisions for the demonstration of E³ control for acquisition of naval aircraft systems, subsystems, weapons, aircraft modifications, C-E equipment, ATC and landing system support equipment and avionics;

(2) ensure that when platforms, systems, subsystems, or equipment are modified, EMI control requirements are updated to the most recent versions of MIL-STD-461/462 in order for each to remain compatible in the changing EME; and

(3) ensure that requests for deviations and waivers are approved by:

(a) the program manager for E³ contractual requirements;

(b) the Certified Tempest Technical Authority (CTTA) for TEMPEST requirements;
and

(c) the PEO or SYSCOM commander for HERO requirements. The WSESRB and NAVORDCEN (N71) must be advised and concur with the waiver before deployment.

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b. AIR 4.1.7 will:

- (1) provide and maintain the E³ engineering processes;
- (2) provide trained certified E³ engineers;
- (3) coordinate with the PMA or IPT lead to ensure that qualified E³ engineers are assigned to support the IPT;
- (4) assist acquisition managers as required in the analysis and tailoring of E³ requirements and ensure implementation of a comprehensive E³ control program;
- (5) monitor TEAM compliance with stated requirements for accreditation and certification;
- (6) provide the TEAM focal point for frequency allocation requests;
- (7) support research, test, and certification portions of the TEAM HERO program;
- (8) maintain certification records of TEAM HERO safe ordnance;
- (9) participate in program reviews as requested;
- (10) provide management of ASEMICAP;
- (11) ensure availability of qualified ATCE to review TEMPEST requirements; and
- (12) analyze and review requests for deviations and waivers of contractual E³ performance or interface requirements, and recommend disposition to the program manager.

9. Review. AIR-4.1.7 shall review annually the contents herein and provide recommendations for changes and deletions to the commander.

10. Forms. DD Form 1423 (8/96), Contract Data Requirements List, S/N 0102-LF-010-5400, and DD Form 1494 (8/96), Application for Equipment Frequency Allocation, S/N 0102-LF-009-4400, may be ordered per CDROM NAVSUP Publication 600.



CRAIG E. STEIDLE
Vice Commander

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